When ^ = 0°, that is to say, when the jet enters cold air, the formula becomes

$$\frac{77\text{-}^{V}}{H} \sim 2g$$

V^2

and as y designates the head *h* the formula becomes

$$\frac{\#}{h} = \frac{273}{t_m}$$

a proportion which has already been given on page 31.

The application of the theory of gaseous jets to the open-hearth furnace is illustrated in Fig. 23, which shows a model of an open-hearth furnace, within the heating chamber of which a current of colored kerosene is circulated. As may be seen in the cut, all of the heating chamber, except that portion occupied by the *bath,* is filled with the kerosene. Here, or more exactly, in all that portion of the heating chamber which is below the sills of the gas ports, water remains, and there is no means by which it can be forced out of the heating chamber.

The presence of the water clearly demonstrates the most important defect of the open-hearth furnace and many other similar furnaces. The hot gases enter and leave the furnace immediately below the roof, and all that portion of the heating chamber below the level of the sill of the ports and above the steel notch or tapping hole, a distance which varies in actual furnaces from 0 m 50 to 1 m 50, is outside of and below the direct current of the gases.

In the model it is clearly shown that the bath of the open-hearth furnace is in a *pocket,* from which the cooled gases cannot flow naturally and where they remain, accordingly, practically immobile. In order to expel these cooled gases from the hearth, as well as to mix the heated gases forming the flame, the gas and the air are directed downward upon the hearth, and as they enter the heating chamber at a high velocity, the phenomenon of the *gaseous jet* is utilized in forcing their current

downward to a depth equal to that of the furnace below the port sills, or down to the level of the tapping hole. In European furnaces the entry velocity of the gas and air varies between 12 and 18 meters per second, while the gas velocity in some American furnaces is as high as 50 meters per second.

If the theory of the *gaseous jet* is correct, all open-hearth